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(58) Field of Search

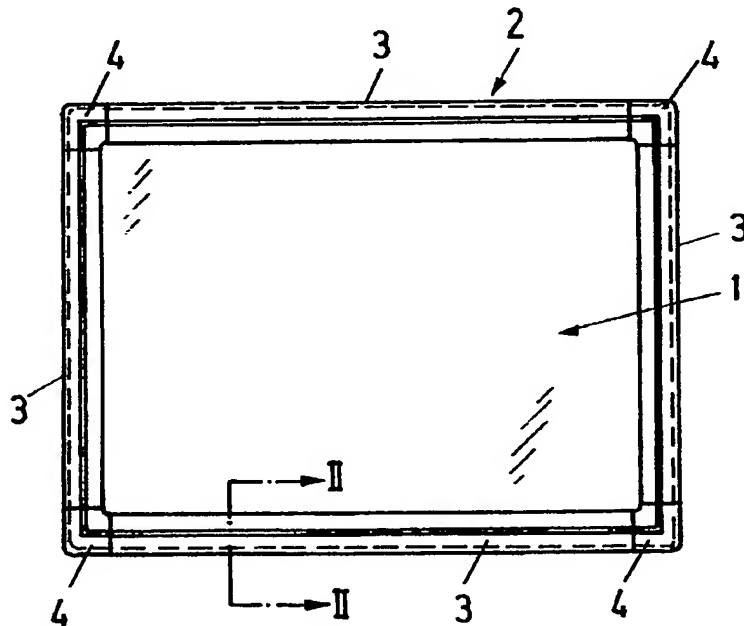
UK CL (Edition M) E1J JGA JM

INT CL<sup>5</sup> B60J 1/08 1/10, E06B 3/96

(54) Window frame

(57) A window system, in particular for rail vehicles, comprises a window pane (1) and a window frame (2) surrounding same. The window frame (2) has straight profile members (3) of plastics material, which terminate short of the corners and are assembled to form a closed frame by way of disposed separate corner connectors (4).

Fig. 1



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Fig. 1

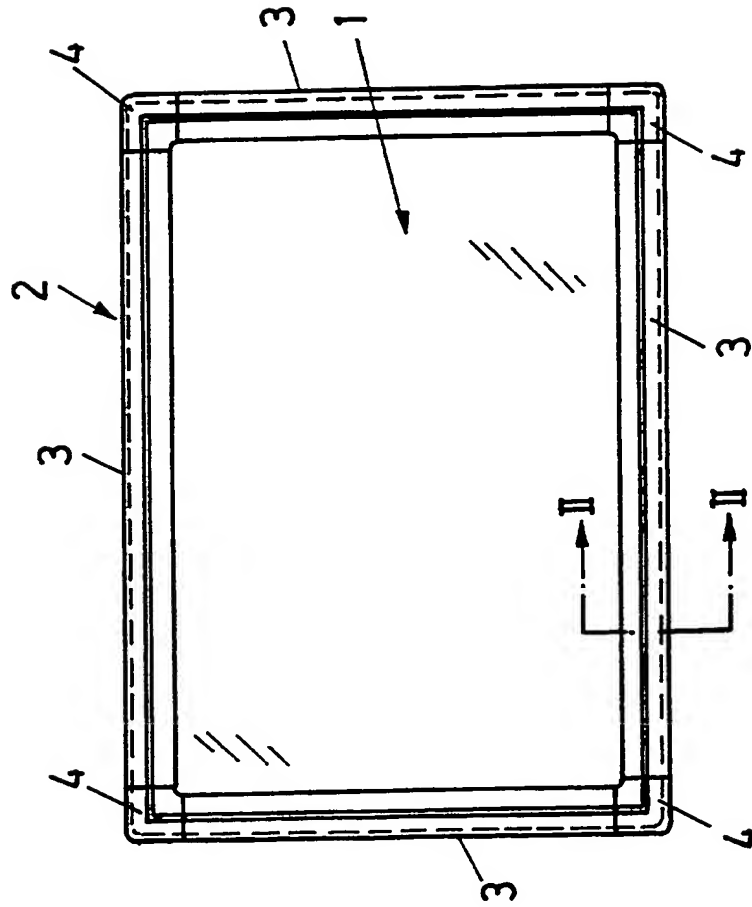
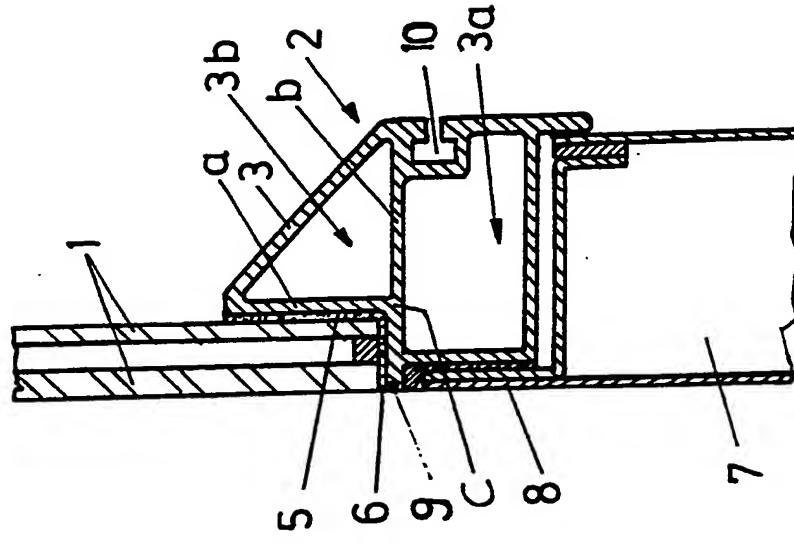


Fig. 2



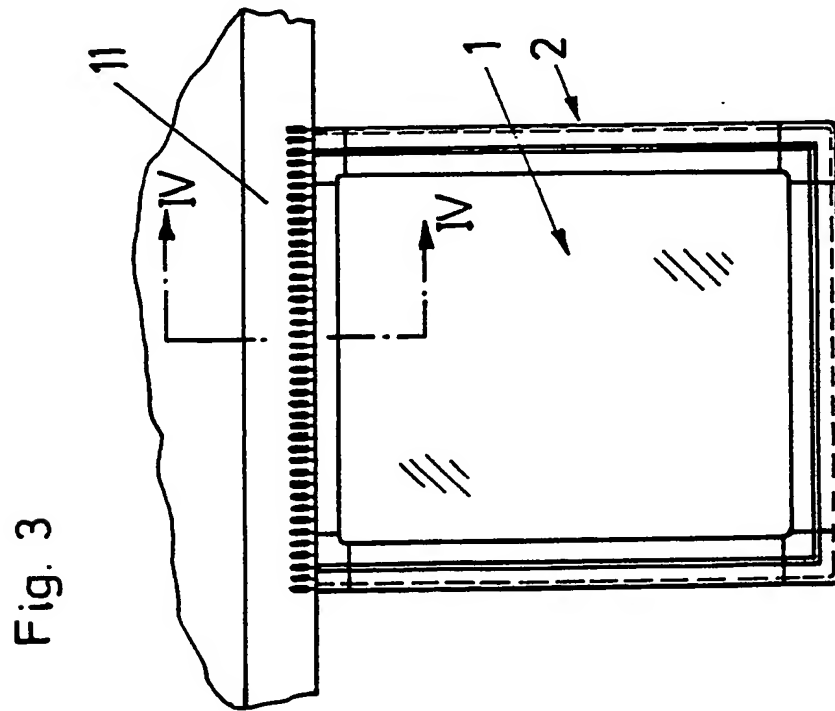
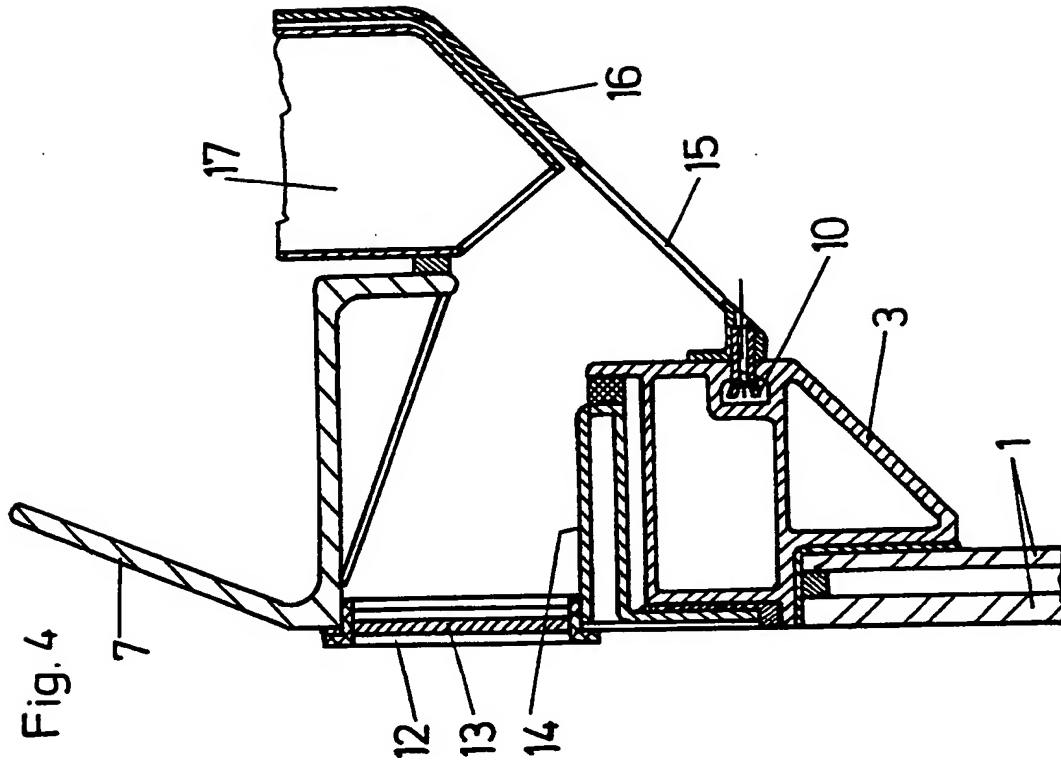


Fig. 5

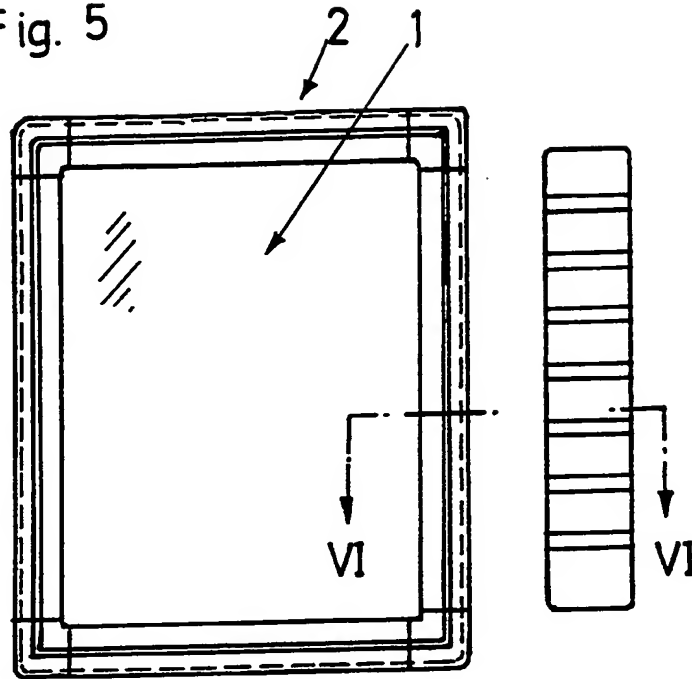


Fig. 6

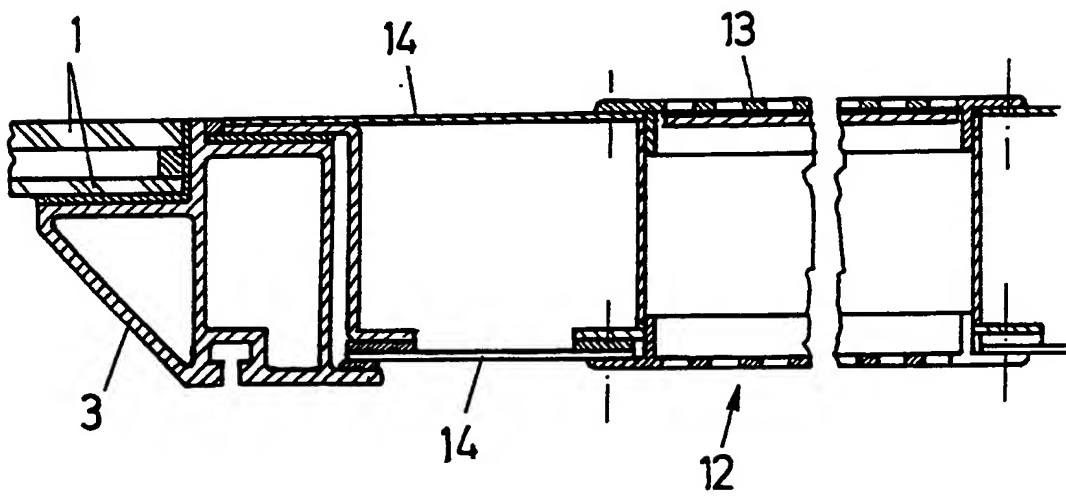


Fig. 7

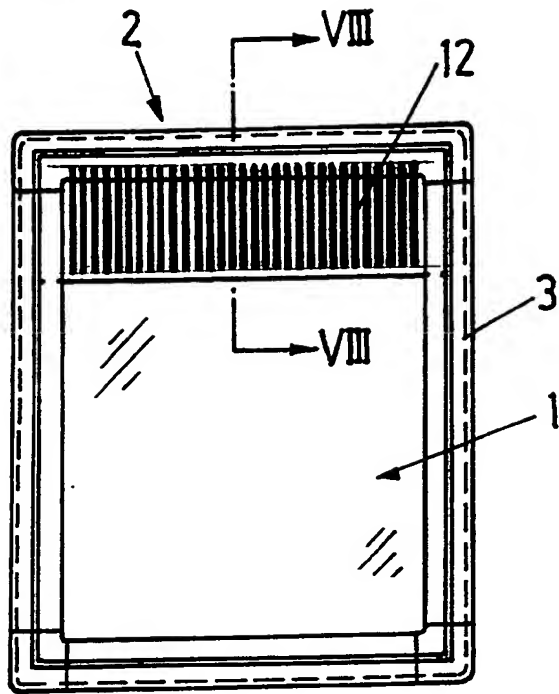


Fig. 8

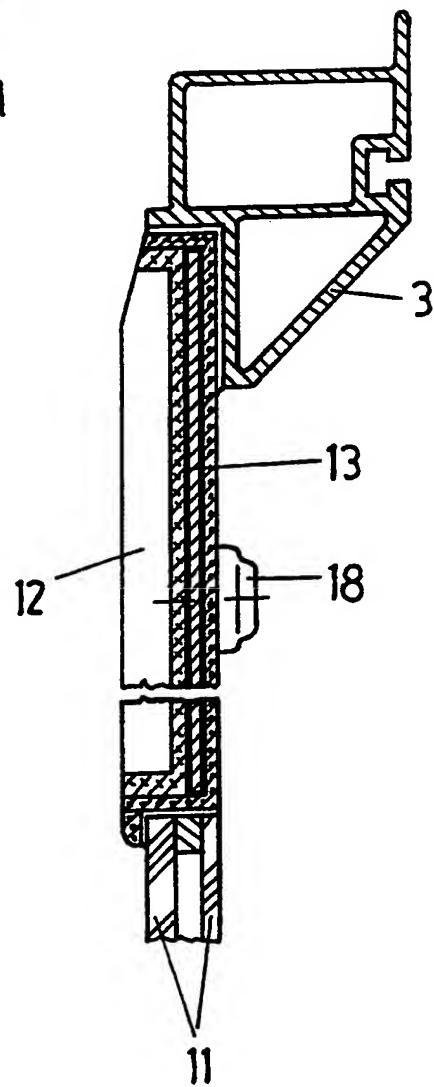


Fig. 9

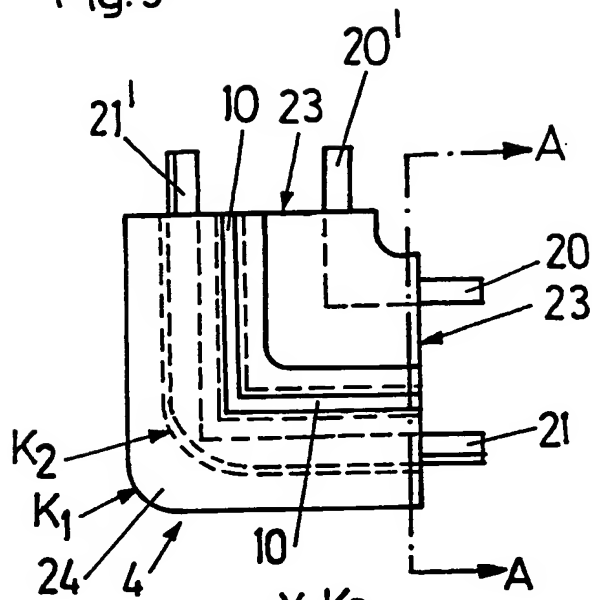


Fig. 11

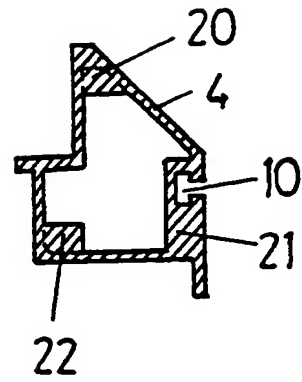


Fig. 10

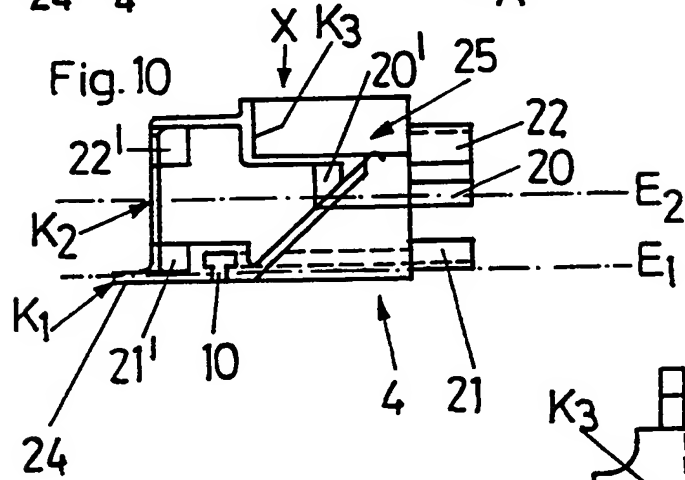
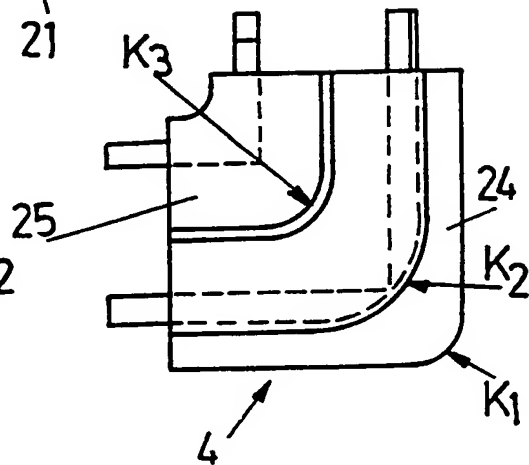


Fig. 12



WINDOW SYSTEM

The invention relates to window systems, in particular, though not exclusively, for rail vehicles, comprising a window pane and a surrounding window frame. The invention also relates to window frames which are suitable therefor and to methods of installing a window system.

Particularly in the field of rail vehicles there is a need for robust window systems which can be easily adapted to different requirements in respect of size and which are simple to install. The visual impression given should also be an attractive one.

It is already known for straight profile members of a window frame which meet at the corners to be connected to form a frame structure by means of internally disposed corner connectors which are not visible from the outside. The sharp-edged external contours of the corners give rise to undesirable notching effects when the structure is fitted into a vehicle.

This invention provides a window system, in particular for rail vehicles, comprising a window pane and a window frame surrounding same, wherein the window frame preferably has straight profile members which are assembled by way of separate corner connectors to form a closed frame, characterised in that the corner connectors form the corners of the frame, wherein at each corner the adjoining profile members each terminate short of the corner and a respective corner connector is arranged between the ends, which are arranged at a spacing from each other, of two adjacent profile members.

The straight profile members, which are preferably extruded fibre-plastics material profile members, can be easily cut to any desired lengths, and can then be assembled by means of the corner connectors to form a closed frame. In principle, assembly is possible and conceivable in a very wide range of different ways and fashions. A self-locking plug-in connection between the corner connector and profile members is particularly advantageous, wherein a centering projection of the corner connectors can be in the form of a wedge of suitable inclination, that is to say the corner connectors and profile members respectively form a force-locking or frictional connection which can carry the joining forces when producing the adhesive

connection. A snap-in connection is also possible, that is to say the corner connectors and profile members respectively have portions which mutually correspond and which automatically snap into engagement when the components are fitted together and thus connect the members in position.

In contrast to the known corner connectors which are disposed in the interior of the profile members, the corner connectors according to the invention are exposed. They themselves form the corners while the profile members do not butt together but terminate short of the corners. That makes it possible for the corner connectors to be adapted to the respective requirements involved, from functional and aesthetic points of view. In particular it is easily possible for the corner connectors to be rounded off on the outside thereof, to avoid notching effects occurring upon installation.

It is preferably envisaged that the window pane may be glued to the assembled frame. For that purpose it is particularly desirable if the window frame has a portion which is of an L-shaped profile, wherein the one limb of the L-shape is glued to the edge face of the pane and the limb of the L-shape, which adjoins same at a right angle, is glued to an edge region of the pane, which edge region is towards the (vehicle) interior. Such an L-shaped profile can be formed for example by the window frame preferably having hollow profile members which include a right-angled triangular profile which, with a short side thereof, bears against or is glued fast to the pane, while the other short side of the triangular profile is extended beyond the apex of the triangle and there bears against or is glued fast to the edge face of the pane.

The invention will now be described by way of example with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

Figure 1 is a view of an embodiment of a window system according to an embodiment of the invention for a rail vehicle, from the inside thereof;

Figure 2 is a view in section taken along line II-II in Figure 1.



Figure 3 is a view from the inside of an embodiment with emergency ventilation arranged above the window system,

Figure 4 is a view in section taken along line IV-IV in Figure 3,

5 Figure 5 is a view from the inside of an embodiment with emergency ventilation in the side wall,

Figure 6 is a view in section taken along line VI-VI in Figure 5,

10 Figure 7 is a view from the inside of an embodiment with emergency ventilation arranged within the frame,

Figure 8 is a view in section taken along line VIII-VIII in Figure 7,

Figure 9 is a view of a corner connector,

Figure 10 is a plan view of a corner connector,

15 Figure 11 is a view in section taken along line A-A in Figure 9, and

Figure 12 is the view indicated at X in Figure 10.

The window system shown in Figures 1 and 2 has a window pane 1 (in the present case a double-glazed assembly) which is held by a window frame generally identified by reference numeral 2. The window frame 2 comprises preferably straight profile members 3 which are assembled to form a closed frame structure by way of corner connectors 4. As Figure 2 shows, the profile members are hollow extruded profile members which comprise fibre-reinforced (for example glass fibre-reinforced) plastics material. The corner connectors 4 are desirably injection-moulded plastics members, preferably comprising reinforced thermoplastic material or thermosetting material.

25 In accordance with this embodiment the corner connectors 4 which are rounded off on the outside are freely visible and themselves form the corners between the straight profile members 3. So that the window frame can be easily assembled, it is preferably provided that the corner connectors 4 and the profile members 3 are connected together

by means of a push-in connection. Details in that respect are described hereinafter and shown in Figures 9 to 11.

Besides the hollow chamber 3a the profile members 3 also have a hollow chamber 3b which is surrounded by a right-angled triangular profile (see Figure 2). The one short side a of the triangular profile is glued to the pane 1 by way of a glue connection 5. The other short side b of the triangular profile is extended beyond the apex C of the triangle and is there glued fast to the edge face of the pane 1 by way of an adhesive connection 6. Suitable adhesives are in particular permanently elastic adhesives.

With the configuration of the profile members shown in Figure 2 therefore, the short side a of the triangular configuration and the other short side b which is extended beyond the apex C define a portion of an L-shaped profile which securely holds the pane 1 by way of adhesive connections 5 and 6 without portions which project beyond the pane on the outside.

For the purposes of installation of the window system, firstly the window frame 2 is formed, then the window pane 1 is glued to the window frame 2 and finally that window frame-window pane unit is glued preferably from the inside to the vehicle structure 7 by way of an adhesive connection 8. That permits easy assembly and provides a window pane 1 which is in flush alignment with the outside of the vehicle, without projecting parts.

In order to provide an emergency exit function, let into the adhesive connection 6 between the window pane 1 and the window frame 2 is a cutting cable 9, preferably a steel wire. At one end, outside the adhesive connection, the steel wire is fixedly secured to the window frame 2, preferably by being glued fast in position, and at the other end it has a handle (not shown) which is disposed in the vehicle interior. When someone pulls on that handle, the steel wire cuts open the adhesive connection 6 and the adhesive connection 5 so that the

window pane can be moved outwardly out of the window frame 2.

The window frame 2 also permits functional or cladding members to be easily connected thereto. For that purpose inter alia there is provided as a fixing means a peripherally extending groove 10 (see  
5 Figure 2) which enlarges in an inward direction and which can be used for example in the manner shown in the embodiments of Figures 3 and 4.

In the embodiment shown in Figures 3 and 4, emergency ventilation 11 is disposed above the window 1. The emergency ventilation includes a ventilation grating 12 which can be closed by  
10 way of a slider 13. The ventilation grating 12 is connected to the profile member 3 of the window frame 2 by way of an intermediate portion 14, wherein all the parts can preferably be glued together.

A cladding member 16 with through openings 15 is fitted into the groove 10 so as to be suspended therefrom and thus forms a robust  
15 termination for the window in an upward direction, while being of an attractive shape. Air can also flow by way of the openings 15 from an air passage 17 of a heating or air-conditioning installation into the interior, or can be removed therefrom by suction through the openings.

In the embodiment shown in Figures 5 and 6 the emergency  
20 ventilation arrangement 12 which has ventilation gratings is integrated into the vehicle wall beside the window. The emergency ventilation arrangement can be closed by way of a ventilation slider 13. The window frame \_\_\_\_\_ with the profile members 3 permits advantageous connection of the intermediate elements  
25 14, by way of which the emergency ventilation arrangement is connected to the window frame.

In the embodiment shown in Figures 7 and 8 the emergency ventilation arrangement is disposed within the window frame 2 and is fixed to the profile members in the upper region of the window frame.  
30 The emergency ventilation arrangement has an external grating and a slider 13 which is disposed therebehind and which can be actuated by way of a rotary knob 18. In the one position openings in the slider 13

are aligned with the outwardly disposed grating and thus permit a flow of air through the emergency ventilation arrangement. In another position the slider completely closes the ventilation slots of the emergency ventilation arrangement.

5        Figures 9, 10, 11 and 12 show in detail one of the four corner connectors. The corner connector comprises a main body in which the groove 10 is also let. Projecting from the main body are on the one hand projections 20, 21 and 22 and on the other hand, at a right angle thereto, projections 20', 21' and 22'. The three projections 20, 21  
10    and 22, and 20', 21' and 22' respectively can be fitted into the profile members 3 shown in the foregoing Figures and in that situation bear firmly against the insides of the walls of the profile members. In order to produce a self-clamping action after the projections have been inserted, the projections 20, 21 and 22, and 20', 21' and 22'  
15    respectively may be of a slightly conical configuration towards their free end, with a very slight wedge inclination already being sufficient. By virtue of the wedge-shaped configuration of the projections, they can be easily introduced into the profile members 3 and, upon further insertion of the projections into the profile  
20    members they finally result in a force-locking or frictional connection between the corner connectors 4 and the profile members 3. That force-locking or frictional connection can then be further assisted and secured by adhesive. Instead of the force-locking or frictional connection or the adhesive connection of the profile  
25    members 3 to the corner connectors 4, it is also possible to provide a connection of positively locking type, in the manner of a snap-in connection, in which for example projections provided with hooks on the corner connectors snap into engagement behind holding projections in the profile members 3.

30        The separation surface 23 between the corner connector 4 and the profile members is disposed perpendicularly to the notional connecting line between two adjacent corner connectors of the finished window

frame. In that way the corner connectors are all of the same configuration. In addition that arrangement means that the profile members can be cut off perpendicularly to their longitudinal direction, in a particularly simple fashion, in order thereby to give  
5 the desired length.

The corner connector shown in Figures 9 to 12 is of an external contour of different curvature in two different spaced-apart planes  $E_1$  and  $E_2$  which are parallel to the window pane. While the corner connector is heavily rounded off on its outside (contour  $K_2$ ) in the  
10 region of a first central plane  $E_2$ , provided in a second plane parallel thereto is a screening portion 24 which is substantially less heavily rounded off (contour  $K_1$ ). Notching effects upon installation can be avoided by virtue of the heavily rounded-off contour  $K_2$ . Nonetheless the less heavily rounded-off contour  $K_1$  makes it possible  
15 to achieve a visually attractive impression when the corner connector is viewed from the inside.

To receive the window pane, a depression 25 which is suited to the shape of the window pane is provided at the outside of the corner connector. The shape  $K_3$  of the depression 25 can be selected  
20 completely independently of the external contours  $K_2$  and  $K_1$ , whereby it is possible for the visual impression from the outside, which is essentially determined by the shape of the window pane, to be different from the visual impression from the inside and different from the heavily rounded-off shape  $K_2$ , which is governed by technical  
25 considerations, in the central region of the connector.

It will be appreciated that the invention is not restricted to the illustrated embodiments. For example it is also possible for the profile members 3 with the corner connectors 4 to be merely glued together, instead of using a push-in snap-engagement connection. It  
30 will be appreciated that the window frame is also suitable for single-glazed or multiple-glazed window panes. The double-glazing arrangement

shown in the specific embodiments is only to be considered as an example. The cutting resistance in regard to the steel wire upon actuation of the emergency exit function can be reduced by a particular configuration for example of the double-glazed pane, with  
5 the outer pane being of larger dimensions.

CLAIMS

1. A window system, in particular for rail vehicles, comprising a window pane and a window frame surrounding same, wherein the window frame preferably has straight profile members which are assembled by way of separate corner connectors to form a closed frame, characterised in that the corner connectors (4) form the corners of the frame, wherein at each corner the adjoining profile members (3) each terminate short of the corner and a respective corner connector (4) is arranged between the ends, which are arranged at a spacing from each other, of two adjacent profile members (3).

2. A window system according to claim 1 characterised in that the separation surface (23) between corner connector (4) and profile members (3) is respectively disposed perpendicularly to the connecting line between two adjacent corner connectors (4).

3. A window system according to claim 1 or claim 2 characterised in that the corner connectors (4) are rounded-off on the outside in the corner region.

4. A window system according to one of claims 1 to 3 characterised in that the corner connectors are of a different external contour ( $K_1$ ,  $K_2$ ) in at least two different spaced-apart planes ( $E_1$ ,  $E_2$ ) which are parallel to the window pane.

5. A window system according to claim 4 characterised in that the corner connectors (4) are heavily rounded off on the outside in a first plane ( $E_2$ ) and in a second plane ( $E_1$ ) which is parallel thereto they have a screening portion (24) with a contour ( $K_1$ ) which is different from the heavily rounded-off contour.

6. A window system according to one of claims 1 to 5 characterised in that the corner connectors (4) each have a depression (25) which is suited to the shape of the window pane, to receive the window pane.

7. A window system according to claim 6 characterised in that the external contour ( $K_1$ ,  $K_2$ ) of the corner connectors (4) is different from the shape ( $K_3$ ) of the depression (25).

8. A window system according to one of claims 1 to 7 characterised in that the straight profile members (3) are preferably hollow extruded profiles which comprise plastics material.

9. A window system according to claim 8 characterised in that the plastics material of the profile members (3) is fibre-reinforced, for example glass fibre-reinforced plastics material.

10. A window system according to one of claims 1 to 5 characterised in that the corner connectors (4) are injection-moulded plastics members, preferably of fibre-reinforced thermoplastic material or thermosetting material.

11. A window system according to one of claims 1 to 10 characterised in that the corner connectors (4) and the profile members (3) are connected by way of a plug-in connection, wherein the corner connectors (4) (profile members 3) have at least one centering projection which at least partially penetrates into the profile member (3) (corner connector (4)) upon assembly and force-lockingly holds together the members (3, 4) to be connected, wherein the members which are connected by a plug-in connection are preferably additionally glued together.



12. A window system according to one of claims 1 to 11 characterised in that the profile members (3) have at least two hollow chambers (3a, 3b).

13. A window system, in particular for rail vehicles, comprising a window pane and a window frame surrounding same, in particular according to one of claims 1 to 12, characterised in that the window frame (2) has preferably hollow profile members (3) which include a right-angled triangular profile which with a short side (a) thereof bears against or is glued fast to the pane (1).

14. A window system according to claim 13 characterised in that the other short side (b) of the triangular profile is extended beyond the apex (C) of the triangle and there bears against or is glued fast to the edge face of the pane (1).

15. A window system according to one of claims 1 to 14 characterised in that the window pane is glued to the window frame, preferably by means of a permanently elastic adhesive (5, 6).

16. A window system according to claim 15 characterised in that the window frame has a portion of an L-shaped profile, wherein the one limb (b) of the L-shape is glued to the edge face of the pane (1) and the limb (a) of the L-shape, which adjoins same at a right angle, is glued to an edge region of the pane (1), which edge region is towards the (vehicle) interior.

17. A window system according to one of claims 1 to 16 characterised in that arranged in the window frame is a fixing means for fixing further members, preferably a continuously peripherally extending groove which is enlarged inwardly.

18. A window system according to claim 17 characterised in that additional shaped members such as for example cladding members, walls (16) of ventilation passages, roller blinds etc are engaged into the fixing means or groove (10), at least over a part of the length thereof.

19. A window system according to one of claims 1 to 19 characterised in that an emergency ventilation arrangement (12) which preferably has a ventilation grating with slider closure (13) is connected to the window frame (2).

20. A window system according to claim 19 characterised in that the emergency ventilation arrangement is glued to the window frame (2) directly or by way of at least one intermediate element (14).

21. A window system according to claim 19 or claim 20 characterised in that the emergency ventilation arrangement (12) is arranged within the window frame (2) between an edge face of the window pane (1) and the window frame (2).

22. A window system according to one of claims 1 to 21 characterised in that let into an adhesive connection (6) between the window pane (1) and the window frame (2) is a cutting cable (9), preferably a steel wire, which has a handle at an end which is guided into the (vehicle) interior.

23. A window system according to one of claims 1 to 22 characterised in that the window frame (2) is glued to the vehicle structure (8) from the inside.

24. A window system substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(The Search report)

-13 -

Application number  
GB 9402694.5

**Relevant Technical Fields**

- (i) UK Cl (Ed.5) E1J (JGA, JM)  
(ii) Int Cl (Ed.M) E06B 3/96; B60J 1/10, 1/08

Search Examiner  
MR J FULCHER

Date of completion of Search  
29 MARCH 1994

**Databases (see below)**

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant  
following a search in respect of  
Claims :-  
1-24

(ii)

**Categories of documents**

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2140853 A	(NORMAN VERNON) nb. Figures 1 and 5	1
X	GB 2118668 A	(LB) Figures 1-6a	1
X	GB 1503484	(DUERDEN)	1
X	GB 1001204	(ICI)	1
X	WO 86/01249	(BROWN) Figures 1, 3, 5	1
X	US 4636105	(JOHANSSON) Figures 1 and 2	1

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